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C₁¹

wherein R¹, R², R³ and R⁴ each are the same or different and are hydrocarbons of between 8 and 18 carbon atoms, optionally containing one or more heterocyclic groups, or R¹ and R² and/or R³ and R⁴ together with the nitrogen atom to which they are bonded are joined together to form a heterocyclic group, optionally containing one or more heterocyclic groups, it being provided that diphenyl guanidine is substantially absent in the rubber composition.

REMARKS

In response to the Office Action of November 20, 2002, Applicants have amended the claims, which when considered with the following remarks, is deemed to place the present application in condition for allowance. Favorable consideration of all pending claims is respectfully requested. Amendments and/or cancellation of claims have been made in the interest of expediting prosecution of this case.

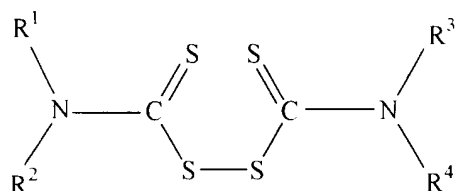
Claims 1-7, 10-19 and 22-24 are pending. By this Amendment, Claim 1 has been amended. Applicants attach Appendix A hereto containing a marked up version of Claim 1. Applicants respectfully submit that no new matter has been added to the subject application nor have any new issues been raised by this amendment. Moreover, it is submitted that the claims as now presented place the subject application in condition for immediate allowance.

The Examiner has rejected Claim 1 under the second paragraph of 35 U.S.C. §112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Specifically, the Examiner alleges that "it is not clear if the

language 'heterocyclic atoms' should read --heterocyclic group-- or --hetero atoms--. Although not necessarily agreeing with the Examiner, Claims 1 and 16 have been amended to recite "heterocyclic groups", thus obviating this rejection. Accordingly, removal of the rejection of Claim 1 under the second paragraph of 35 U.S.C. §112 is respectfully requested.

The Examiner has rejected Claims 1-7, 10-19 and 22-24 under 35 U.S.C. §103(a) as being obvious over Materne et al. U.S. Patent No. 6,273,163 B1 ("Materne") in view of EP 479,526 ("EP '479").

As pointed out by the Examiner in the Office Action, nowhere does Materne disclose or suggest a rubber composition obtained from (a) a rubber component, (b) a silica filler and (c) "a thiuram disulfide of the general formula



wherein R¹, R², R³ and R⁴ each are the same or different and are hydrocarbons of between 8 and 18 carbon atoms, it being provided that diphenyl guanidine is substantially absent in the rubber composition" as presently recited in amended Claim 1. Nor does Materne disclose or suggest a method for increasing the Mooney Scorch value of a rubber composition by employing the

specifically recited thiuram disulfide wherein diphenyl guanidine is substantially absent in the rubber composition as generally recited in amended Claim 16.

Rather, Materne discloses rubber compositions containing starch/plasticizer composite reinforcing fillers together with (a) a rubber component; (b) a silica filler and (c) vulcanization accelerators such as benzothiazole, alkyl thiuram disulfide, guanidine derivatives and thiocarbamates. Materne further discloses species within each of the genus accelerators of which is disclosed tetramethyl thiuram disulfide as the alkyl thiuram disulfide. At no point is there any appreciation in Materne of employing the specifically recited thiuram disulfide of amended Claims 1 and 16 where the R^1 , R^2 , R^3 and R^4 substituents (as shown in the amended claimed compound) are "the same or different and are hydrocarbons of between 8 and 18 carbon atoms" in a rubber composition with diphenyl guanidine being substantially absent in the rubber composition or that the mooney scorch value of rubber composition can be increased by employing the specifically recited thiuram disulfide with diphenyl guanidine being substantially absent in the rubber composition.

EP '479 fails to cure the deficiencies of Materne. Specifically, EP '479 nowhere provides any disclosure, suggestion, or even a hint that employing the specifically recited thiuram disulfide of amended Claims 1 and 16 where the R^1 , R^2 , R^3 and R^4 substituents are "the same or different and are hydrocarbons of between 8 and 18 carbon atoms" in a rubber composition with diphenyl guanidine being substantially absent therefrom together with a rubber component and a

silica filler increases the mooney scorch value of the resulting rubber composition without sacrificing other physical properties such as the tangent delta value.

Rather, EP '479 discloses rubber compositions containing a rubber component, sulfur and an accelerator such as tetra-2-ethylhexyl thiuram disulfide, diphenyl guanidine and di-2-ethylhexyl dithiocarbamic acid antimoate. At no point is there any appreciation in EP '479 of employing the thiuram disulfide of amended Claims 1 and 16 where the R^1 , R^2 , R^3 and R^4 substituents are the same or different and are hydrocarbons of between 8 and 18 carbon atoms in a rubber composition containing a rubber component and a silica filler with diphenyl guanidine being substantially absent in the rubber composition or that the mooney scorch value of rubber composition can be increased by employing the specifically recited thiuram disulfide with diphenyl guanidine being substantially absent in the rubber composition. Moreover, as EP '479 merely suggests tetra-2-ethylhexyl thiuram disulfide with or without diphenyl guanidine in a rubber composition containing a rubber component and sulfur, cannot possibly provide any suggestion or motivation of adding to a rubber composition containing a rubber component and a silica filler a thiuram disulfide wherein R^1 , R^2 , R^3 and R^4 of the thiuram disulfide are the same or different and are hydrocarbons containing from about 8 to about 18 carbon atoms with diphenyl guanidine being substantially absent therefrom as generally set forth in Claims 1 and 16. Thus, one skilled in the art would not be motivated by the EP '479 reference to modify the rubber composition of Materne to arrive at the presently claimed rubber composition of Claims 1 and 16 with any expectation of success.

In order to meet his burden of a *prima facie* obviousness rejection, the Examiner alleges that "[i]t would have been obvious to one of ordinary skill in the art to have included an alkyl thiuram disulfide containing at least 8 carbon atoms because Materne especially desires such compounds and EP teaches that these compounds impart excellent scorching stability and thermoresistant properties to the rubber. This wholly unsupported allegation cannot possibly serve as a basis for this rejection. As stated above, Materne merely discloses rubber compositions containing, inter alia, vulcanization accelerators such as alkyl thiuram disulfides of which tetramethyl thiuram disulfide is the only example and guanidine derivatives. At no point is there any appreciation in Materne or EP '479 of employing the specifically recited thiuram disulfide of amended Claims 1 and 16 where the R¹, R², R³ and R⁴ substituents are the same or different and are hydrocarbons of between 8 and 18 carbon atoms in a rubber composition containing a rubber component and a silica filler with diphenyl guanidine being substantially absent in the rubber composition. EP '479 is deficient for at least the reasons set forth above. Accordingly, it is submitted that the Examiner has not made out a case of *prima facie* obviousness in rejecting Claims 1-7, 10-19 and 22-24 over Materne in view of EP '479.

Despite the fact that no *prima facie* case of obviousness exists, the Examiner fails to appreciate the enhanced effects obtained in employing the specifically recited thiuram disulfide where the R¹, R², R³ and R⁴ substituents are the same or different and are hydrocarbons of between 8 and 18 carbon atoms in a rubber composition with diphenyl guanidine being substantially absent therefrom together with a rubber component and a silica filler in the presently claimed rubber composition. Applicants have surprisingly discovered that rubber compositions containing a combination of a rubber component, a silica filler and the specifically recited thiuram

disulfide wherein diphenyl guanidine is substantially absent in the rubber composition have improved performance characteristics, including a significantly higher mooney scorch value, when compared to compositions containing diphenyl guanidine (which is within the scope of Materne). This is illustrated in applicants' examples set forth in the specification which shows that by using a tetraalkyl (C_{12} - C_{14}) thiuram disulfide, instead of diphenyl guanidine, results in a rubber composition having a significantly improved mooney scorch value without any sacrifice in physical properties over a rubber composition containing diphenyl guanidine.

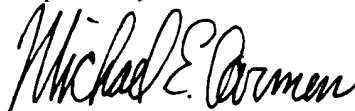
As shown in Table IV of applicants' specification, when comparing applicants' Examples 1-2 employing a rubber composition containing a thiuram disulfide where the R^1 , R^2 , R^3 and R^4 substituents are the same or different and are hydrocarbons of between 8 and 18 carbon atoms (within the scope of the invention) with Examples 3 and 4 which employ a rubber composition containing a thiuram disulfide where the R^1 , R^2 , R^3 and R^4 substituents contain 6 carbon atoms (outside the scope of this invention) and Comparative Example A employing a rubber composition containing diphenyl guanidine ("DPG") (outside the scope of this invention), each of the rubber compositions of Examples 1 and 2 provided an improved mooney scorch value. For example, when comparing the rubber composition of Example 2 to the rubber compositions of Example 4 and Comparative Example A, the rubber composition of Example 2 possessed a mooney scorch value (3 pt. rise time) of 13 while the rubber compositions of Example 4 and Comparative Example A possessed a mooney scorch value of 12 and 10, respectively. It is also noteworthy that the cure times of the rubber compositions were relatively the same by replacing 1 phr DPG with 0.25 phr of the presently recited thiuram disulfide for Example 2. This is highly advantageous in that better processing of the rubber compositions can be achieved without

sacrificing other physical properties while also obtaining an economical advantage by utilizing significantly less thiuram disulfide compared to DPG. Accordingly, Applicants' examples clearly establish that replacing diphenyl guanidine with a tetraalkyl (C_8-C_{18}) thiuram disulfide in a rubber composition containing a rubber component and a silica filler results in a significantly improved scorch safety without any sacrifice in physical properties of the rubber composition. Nothing in Materne or EP '479 would lead one skilled in the art to expect these superior results.

Since Materne, alone or in combination with EP '479, fails to disclose or suggest a rubber composition containing a rubber component, a silica filler and a thiuram disulfide wherein R^1 , R^2 , R^3 and R^4 of the thiuram disulfide are the same or different and are hydrocarbons containing from about 8 to about 18 carbon atoms with diphenyl guanidine being substantially absent in the rubber composition, Claims 1-7, 10-19 and 22-24 are believed to be nonobvious over Materne and EP '479. In view of the foregoing, withdrawal of the rejection under 35 U.S.C. §103(a) is warranted and such is respectfully requested.

For the foregoing reasons, it is submitted that amended Claims 1-7, 10-19 and 22-24 as presented herein are believed to be in condition for immediate allowance. Such early and favorable action is earnestly solicited.

Respectfully submitted,



Michael E. Carmen

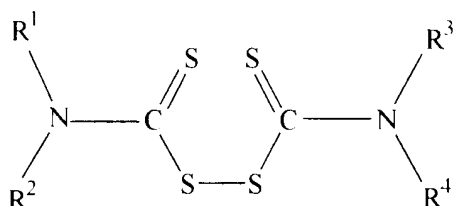
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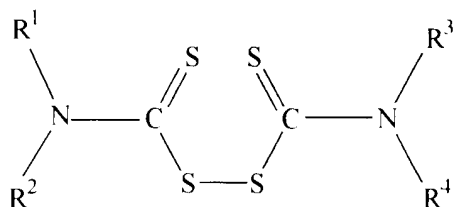
APPENDIX A

1. (Twice Amended) A rubber composition comprising (a) a rubber component; (b) a silica filler; and, (c) at least one thiuram disulfide accelerator of the general formula



wherein R¹, R², R³ and R⁴ each are the same or different and are hydrocarbons of between 8 and 18 carbon atoms, optionally containing one or more heterocyclic groups, or R¹ and R² and/or R³ and R⁴ together with the nitrogen atom to which they are bonded are joined together to form a heterocyclic group, optionally containing one or more heterocyclic [atoms] groups, it being provided that diphenyl guanidine is substantially absent in the rubber composition.

16. (Twice Amended) A method for increasing the Mooney Scorch value of a rubber composition which comprises the steps of forming a rubber composition comprising (a) a rubber component; (b) a silica filler; and, (c) at least one thiuram disulfide accelerator of the general formula:



wherein R^1 , R^2 , R^3 and R^4 each are the same or different and are hydrocarbons of between 8 and 18 carbon atoms, optionally containing one or more heterocyclic groups, or R^1 and R^2 and/or R^3 and R^4 together with the nitrogen atom to which they are bonded are joined together to form a heterocyclic group, optionally containing one or more heterocyclic [atoms] groups, it being provided that diphenyl guanidine is substantially absent in the rubber composition.